

Article Title Page

Services and Service Systems under a Mesoscopic Perspective

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Structured Abstract:

Purpose – In a recent paper, Tronvoll, Edwardsson, and Vargo observe that the ontological status of service systems is still not well articulated in the literature, despite the influence of an ontological perspective on the way services and service systems are understood and explained. The purpose of this paper is to clarify the nature of services and service systems, providing a formal definitional framework that, while grounded in rigorous ontological distinctions, reflects as much as possible the everyday business language, which doesn't focus on single economic transactions at the microscopic level, but rather sees services at a coarser level: the mesoscopic level. Such framework will be used to discuss two core issues of the SDL approach: the relationship between services and value co-creation, and the relationship between services and service systems.

Design/Methodology/Approach – Our ontological model services describes services as complex temporal entities, constituted by interrelations of *facts* of different kind (states, actions and processes), occurring in a wider service system. A crucial role is played by the notion of *commitment*, which allows us to provide a definition of service as a generic commitment to guarantee the execution of value co-creation actions.

Findings – the paper provides an answer to the following foundational questions:

1. In the SDL literature, a service is defined at the microscopic level, i.e. at the level of a single value co-creation interaction. A service system seems to be defined instead at the mesoscopic level, as a dynamic, possibly complex configuration of resources, which has its own lifecycle and a unique identity. How to reconcile the two views?
2. What is value co-creation, exactly? Does it focus on a single value experience (the customer's one), or does it also take into account the supplier's experience, including the whole value constellation? Can we really *define* a service as a value co-creation phenomenon, or the two notions are different although related?

Research limitations/implications – An important research challenge which is only marginally touched by this work is the ontological analysis of the notion of value.

Practical implications – Besides helping in understanding, clarifying and formalizing the basic notions of service science, we believe that this approach is also useful for describing and organizing different kinds of services.

Originality/value – The main contribution is the rigorous characterization of services and service systems in ontological terms.

Keywords: Services, service systems, service science, value co-creation, ontology

Article Classification: Conceptual paper



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Services and Service Systems under a Mesoscopic Perspective

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Abstract

Purpose – In a recent paper, Tronvoll, Edwardsson, and Vargo observe that the ontological status of service systems is still not well articulated in the literature, despite the influence of an ontological perspective on the way service systems are understood and explained. The purpose of this paper is to clarify the nature of services and service systems, providing a definitional framework that, while grounded in rigorous ontological distinctions, reflects as much as possible the everyday business language, which doesn't focus on single economic transactions at the microscopic level, but rather sees services at a coarser level: the mesoscopic level.

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Introduction

In a recent paper, (Tronvoll et al. 2011) observe that the ontological status of service systems is still not well articulated in the literature, despite the influence of an ontological perspective on the way service systems are understood and explained. The purpose of the present work is to discuss the ontological status of services and service systems in the light of Service Dominant Logic (S-D Logic), leveraging on the foundational framework introduced in (Ferrario & Guarino 2009) and (Ferrario & Guarino 2012), and recently extended in (Nardi et al. 2013). Differently from S-D Logic, such framework provides a definition of service which doesn't focus on single economic transactions at the microscopic level, but rather adopts a different point of view, describing services at a coarser level: the mesoscopic level. Under this view, passing the salt to your friend at dinner is not a service, at least not in the usual business sense, according to which services are seen more as business activities more or less stable in time, so that occasional favors don't count as services.

In the present paper I will explore the implications of a mesoscopic perspective on services in more detail, discussing it with respect to two core issues of the S-D Logic approach: the relationship between services and service systems, and the one between services and value co-creation.

Services as processes

In (Ferrario & Guarino 2009), our first ontological claim was that the classic distinction between goods and services can be explained by observing that services are entities whose identity develops in time (in ontological terms, *occurrences*¹), while goods are entities whose identity lasts in time (in ontological terms, *objects*). In this view, it is exactly the temporal nature of services which explains why they are radically incompatible with goods: being occurrences, services are just disjoint from goods, which are objects. Objects *participate* to occurrences, but are disjoint from them. In (Ferrario & Guarino 2009) we discussed how this ontological distinction explains Hill's distinction between goods and services (Hill 1977), which is based on the fact that services are transactable but not transferable. In short, the reason why services are not transferable is that transferability involves a transfer of ownership, and ownership implies full control (including the power to destroy what we are in control of). We can never have full control of occurrences, since they are frozen in time: we can influence the future, up to some extent, but the past is frozen. Since a service requires to develop in time in order to exist, we can never transfer existing services (we can perhaps admit that future services are transferable, though). As acknowledged by (Poels 2010), this is in line with the S-D logic, which adopts the 'service as process' view:

A service is a *process* of applying resources for the benefit of another (Vargo & Lusch 2004).

However, recent service science papers adopt a different, alternative definition, suggesting that

Services are value co-creation phenomena that arise among interacting service system entities.
(Spohrer & Maglio 2010).

Despite these two definitions agree on the fundamental nature of services as occurrences, they appear rather different from each other, and they both present relevant ontological and terminological problems, which also affect two other key terms: *service system* and *value co-creation*. In the following I will attempt to disentangle this issue, which in my understanding originates –among other things– from a confusion between two perspectives towards economic systems: the microscopic perspective and the mesoscopic perspective.

Microscopic vs. mesoscopic services

Let us consider the full version of the S-D logic's service definition mentioned above:

A service is the application of specialized competences (knowledge and skills) through deeds, processes, and performances for the benefit of another entity. (Vargo & Lusch 2004).

This is clearly a definition which focuses on an elementary economic interaction, at the *microscopic level*. Still there are some aspects in the very notion of service which go beyond the microscopic view, as there seems to be more in a service than just an actual, specific application of competences: according to the latin etymology of the term, a *servus* is somebody who is at your disposal, ready to do actions (i.e., specific applications of competences) for your benefit; in this view, it is not so much a specific action which counts as a service, but rather the commitment to perform some kinds of actions. Indeed, in many cases, the very presence of such commitment is enough for the service consumer to experience value. Consider for instance a telephone company, which provides –we say– a telephone service. Within a specific customer contract, we don't say it provides multiple services, but just one service, which is active even when no telephone calls occur: you pay for the *possibility* to make a call when you like. So in this case the service is not the application of a specific competence, but rather the commitment to perform some actions in a certain way (in some cases, even independently from actually having the necessary competence).

So, it seems that, to reflect the usual understanding of services in the business language, we need to position ourselves at a coarser level, the *mesoscopic level*. I believe that this is the view that emerges from (Alter 2011). Alter's list of "common examples for services" (such as an ATM cash dispenser, an emergency service, or a garbage collection service) is indeed a very good rough test to verify what people mean when they use the word 'service', which he

¹ I use here the term *occurrence* as synonymous of the technical term *perdurant* adopted in the DOLCE ontology (Borgo & Masolo 2009). Occurrences include events, processes, and states.

considers as synonymous of ‘economic activity’. However, the definition of service he provides, which is very similar to the Vargo and Lusch’s one, does not allow to draw such conclusion:

Services are acts performed for someone else, including the provision of resources that someone else will use.
(Alter 2008)

With our definition of service, just about any business activity is a service *because it involves purposeful action* performed for the benefit of someone else. (Alter 2011, my emphasis)

As we can see, the problem is that the second observation above is logically incorrect, because the fact that a business activity *involves* a purposeful action does not imply that such activity *is* a purposeful action. Indeed, as we have seen, business activities necessarily involve something else besides actions: some kind of *commitment*.

In the light of this analysis, we have two possible terminological choices. On one hand, if we want the ordinary business understanding of ‘service’ to be the same as ‘business activity’, we need to adopt a mesoscopic-level notion, which includes that of commitment; in this case, we may use the terms ‘service (inter)action’, ‘service delivery’, ‘service experience’, or ‘service value (co-)creation’ to refer to the microscopic actions under different connotations. On the other hand, if we want to stick to a microscopic-level notion of service, we have to carefully distinguish services from business activities, which are defined at the mesoscopic level, and include services among their constituents. The definitional framework introduced in (Ferrario & Guarino 2009) and (Ferrario & Guarino 2012), which I will briefly describe below, makes the first choice, in the attempt to reflect as much as possible the everyday business language, without imposing unnecessary changes in the way people talk (although possibly changing a bit the way they think).

In any case, independently from the terminological choices, I think that it is exactly a generalized, mesoscopic notion of service –as denoting a business activity and not a specific economic interaction– which appears to be lacking in the S-D approach.

Service systems as mesoscopic entities

Let us focus now on service systems. While the classification of services according to the microscopic/mesoscopic distinction may appear to be unclear to somebody, it seems evident that, whatever service systems are, they are entities defined at the mesoscopic level, both because they may be involved in multiple service interactions, and they presuppose a time span which goes beyond that of a single service interaction: they have therefore –so to speak– a coarser granularity, both in the temporal and in the spatial dimension. Indeed, in the service science literature a service system is defined as a dynamic, possibly complex configuration of resources, which has “a beginning, a history, and an end”, and “has a unique identity” (Maglio et al. 2009). But what is the glue that keeps these resources together, both synchronically and diachronically, distinguishing one service system from another and guaranteeing its identity through time? In the everyday speaking, people would say that, throughout its life, a service system produces *the same service*, although of course it is involved in multiple service interactions. So, the glue keeping the resources together is *being involved in the same service*. To capture this intuition, we need to adopt the mesoscopic view of service based on commitment. Indeed, the glue is a *commitment*. More exactly, as specified below, it is a generic commitment to guarantee the execution of (value co-creation) actions of a certain kind, according to suitable conditions. In this view, a service system is the sum of all resources which are somehow involved in a service commitment

A further concern are the *boundaries* of a service system. The simple question is: is the customer part of the service system? If the customer is involved in value co-creation, the obvious answer should be yes! Otherwise, if a service system is just one party of the service interaction, what makes it a service system? In particular, is an isolated agent a service system? This seems to be perfectly possible according to the leading proponents of service science (Maglio et al. 2009), who, as observed by (Alter 2011), consider service systems as “complementary components of economic exchange”. I find the idea of considering the customer and the provider as a separate service systems very strange and unintuitive, and in contradiction with the very basic assumptions of the S-D logic. In my view, a single individual can be part of multiple service systems, depending on responsibility patterns (commitments) which may appear or disappear at different times. For example, the same person could be involved in different service systems (as a worker and as a volunteer). Altogether, I find Alter’s notion of work system –although ontologically vague– much more useful to clarify what a service system is.

Services and value co-creation

Let us now go back to the alternative, influential definition of service proposed recently in the service science literature:

Services are value co-creation phenomena that arise among interacting service system entities.
(Spohrer & Maglio 2010).

I find this definition very confusing. In the marketing science literature, the notion of value co-creation seems to be mainly focusing on the customer's value (Prahalad & Ramaswamy 2004), although the emergence of complex value constellations in modern service-based economy is also acknowledged, as shown for example in the IKEA case discussed in the seminal paper by Normann and Ramirez (Normann & Ramirez 1993):

The work-sharing, co-productive arrangements the company offers to customers and suppliers alike force both to think about value in a new way – one in which customers are also suppliers (of time, labor, information, and transportation), suppliers are also customers (of IKEA's business and technical services), and IKEA itself is not so much a retailer as the central star in a constellation of services [. . .]. The result: IKEA has succeeded, arguably, in creating more value per person (customer, supplier, and employee) [. . .]

Now, what is value co-creation in this case? Does it focus on a single value experience (the customer's one), or does it also take into account the supplier's or employee's experience, including the whole value constellation? It seems that Vargo and Lusch have the latter view in mind, when they write:

Although S-D logic is inherently customer-centric –that is, the beneficiary is considered the determiner of value– value co-creation does not focus solely on the beneficiary. This perspective would neglect to recognize the benefits the firm receives from an exchange. Value co-creation implies that value created through exchange is based on the mutually beneficial relationships among service systems and each system makes a decision for whether or not the result of the exchange is valuable, based on context and experience. (Vargo & Lusch 2010)

This could also be the view Maglio, Kieliszewski and Spohrer have in mind, when they introduce service science as the study of value co-creation:

The bank cannot exist without the funds customers store and the customer cannot have the convenience of access through various mechanisms (checking, automatic tellers, bank branches) without the capabilities the bank provides. Value is co-created by the interaction of the two. (Maglio et al. 2010)

Clearly the question arising from the above statement is *who's value?*² The bank's value of being able to invest the customers' funds seems to be clearly a result of the interaction process, as well as the customer's value of exploiting flexible payment means. So, it seems clear that a constellation of values (plural is crucial here) is (co-)created by the interactions described in the examples above. The point is how the notion of service is related to those of value co-creation and interaction.

Indeed, these interactions are service exchange interactions: at the origin of the S-D logic there is Bastiat's idea that people exchange services for other services (Bastiat 1860), so "Service is at the basis of all exchange" (Vargo & Lusch 2010) (notice it is service, not value that is exchanged, because value is subjective). Now, each of the two services exchanged implies some value co-creation, but also the overall service exchange results in value co-creation, and such global value co-creation is not a service in itself! If we define service just as value co-creation, we have no way to

² This is basically the point addressed in (Grönroos & Voima 2012), whose work we ignored when we first published these observations on value co-creation in (Ferrario & Guarino 2012). Such work is certainly a fundamental contribution towards a proper understanding of the notion of value (co-)creation. However, although the authors recognize that "value for the customer and financial value for the firm are two sides of the value creation coin", they focus specifically on value creation for the customer, and they don't address the service provider perspective.

understand what is exchanged on each side, and so, for example, we cannot describe how a certain service can be negotiated. So, clearly, a service implies a value co-creation process, but it is too simplistic to collapse the two notions, saying that service is value co-creation. In other words, the notion of service is necessarily asymmetric, since it focuses on a value proposition on the provider's side and a value experience which is inherently customer-centric, while the notion of value co-creation *as emerging from the all-encompassing service interaction process* is clearly symmetric (unless we eliminate the ambiguity saying "customer's value co-creation"). In sum, I must conclude that the definition above by Spohrer and Maglio is non-informative and inappropriate, differently from the one by Vargo and Lusch, which is just focused on the microscopic perspective.

Modelling services and service systems at the mesoscopic level

Let us see now how services and service systems can be modelled at the mesoscopic level. I will briefly present a model we have started developing in 2008 (Ferrario & Guarino 2009), which is still being revised and extended in various ways (Ferrario et al. 2010; Ferrario & Guarino 2012; Nardi et al. 2013). The initial motivation behind our approach was to develop an ontology of services suitable to be used in the e-government domain, where interoperability is particularly crucial, and multiple understandings of the word 'service' co-exist. Looking at the computer science literature, it was immediately evident that most of the available models adopt a "black box" view of services, describing them as transfer functions from an input to an output state, with a strong focus on the external service interface. Under this view, the internal details concerning how the service is performed are kept hidden, despite their relevance from the business point of view. Business applications need not only specify what the service does, but also how the service is performed and when the various processes involved in a service occur. Moreover, contracts and service level agreements need to refer to internal and contextual details (i.e., how the service interacts with its environment). In other terms, one needs to be able to look both inside and outside of the box, i.e., we need to adopt a glass box view, where the box is in this case, as (Alter 2006; Alter 2010) suggests, the whole service system.

The internal structure of a service, as well as its relationship with the value co-creation process, is depicted in Figure 1. The picture presents a complex temporal entity involving three main components: the Service Commitment, the Service Process, and the Service Value Co-creation. All together, as we shall see, they describe the evolution of a service system, i.e., the service system life cycle. The horizontal axis is the temporal dimension, so that the various components in the picture are occurrences of different kinds, possibly involving different resources, occurring more or less at the same time. The vertical axis describes a relation of *ontological dependence*: value co-creation requires a service process to occur, and in turn a service process requires a commitment. So the first and most important component, in the light of the above discussion on the mesoscopic view, is the commitment, which holds as long as the provider is willing to offer the service content, and is the glue that keeps the other components together. The interplay among such components is described in the following.

Service Commitment

The service commitment is the crucial notion in our approach, so let me start reporting its definition:

A *Service Commitment* is an agent's explicit and enduring commitment to *guarantee* the execution of some type of *core actions*, on the occurrence of a certain *triggering event*, in the interest of another agent and *upon prior agreement*, according to a certain specification (*service description*) which constrains the way service actions will be performed. (Ferrario & Guarino 2012)

In terms of the DOLCE (Masolo 2003; Borgo & Masolo 2009; Gangemi et al. 2002) ontology of temporal entities, the Service Commitment is a *state*, resulting from an act of engagement to assume an obligation for a specified period in the future. In such period, the agent is in the commitment state. In most cases, two kinds of service commitment need to be distinguished: a *generic commitment* towards potential customers, whose service description is intended to facilitate service discovery, and a *specific commitment* towards a particular customer, where the service description takes the form of a binding contract, resulting from a negotiation process³. The commitment is about one or more

³ There are important differences between generic and specific commitment. Generic commitment is a state resulting from an act that is in a sense uni-directional, as it does not imply an explicit agreement. As generic commitment is directed towards a generic, potential customer, it is not strictly speaking binding for the provider. Until there is at least one specific, actual customer, the

potential *actions* of a certain kind, called *core actions*, whose execution is *guaranteed* by the provider, and which are described in a *service description*, which includes constraints on such the way such actions will be executed and possibly also on the type of customer whom the service is addressed to. For commercial services such description can be assimilated to the service offering.

A peculiar aspect of our definition is that the agent who commits (i.e., the service provider) just *guarantees* the execution of the core action, without necessarily being the one who executes it. In many cases, the action is indeed executed by a *service producer* delegated by the provider, but in some interesting cases the service producer may coincide with the customer: think for instance of the rental of a parking lot, where the core action (parking) is executed by the customer.

Further peculiarities in the definition are the explicit mention of a *triggering event*, which allows to clearly specify when the core action is expected to be executed (as opposite to a generic goal specification), and the provision of an *explicit agreement* on the side of the customer (Hill 1977), without which the core action's execution would result in a tyranny, and not a service.

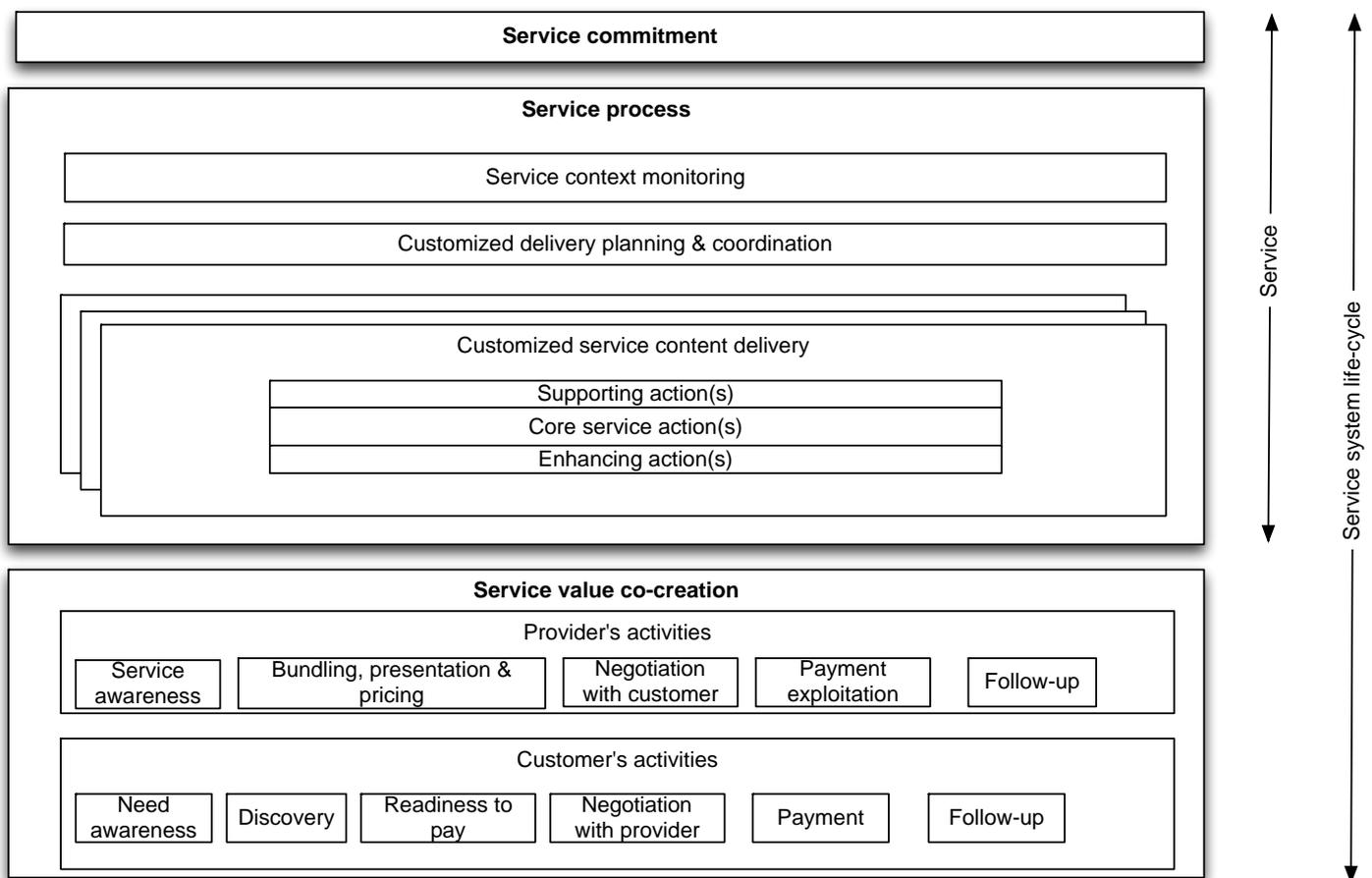


Figure 1. Service and service system life-cycle.

provider cannot be directly sanctioned for not having respected his or her commitment. So not honoring a generic commitment can obviously result in a loss of credibility or reputation, but not in a direct sanction. Specific commitment, on the other hand, is the state in which both the provider and an actual customer are after a mutual agreement, most of the times consisting in the signature of a contract. The contract describes how the service will be implemented for the individual customer, so normally it specifies the service description in more detail. Two relevant differences with the generic commitment are given by the fact that the contract commits both parties, not only the provider, so it is the result of an agreement with a greater binding power, whose violation usually entails a sanction, that may be described in the contract itself.

Service Process

A *Service Process* is the actual implementation of a service commitment, consisting of a number of interdependent actions including those necessary to monitor the triggering events, the core actions mentioned in the commitment, and any further actions aimed at supporting or complementing the successful execution of such core actions. The core constituent of a service process is a set of basic activities (each called *customized service production*), centered around the delivery of service content to a *single customer*. In addition to the *core service action(s)* depending on the service nature, a customized service production may include *enhancing actions* intended to increase the service value or differentiate it from those of competitors (Hill 1977), as well as *supporting actions* needed to enable the core service consumption and *follow-up actions* intended to monitor the core action's results. In addition to customized delivery activities, the service process includes various back-office activities concerning *customized delivery planning and coordination*, plus an activity we have labelled as *service context monitoring* – which seems to be neglected by most current approaches – which involves the various actions necessary to detect the event that triggers service production, which can be an external situation or a customer's request: without an explicit modelling of such activity, there would be no way to account for delays or improper management of triggering events. What actually happens in the service process is partly constrained by the service description, and, more importantly, by the contract, which defines and constrains the type of actions that must and/or can be executed in the service process.

Service

After having introduced their basic components, we are finally in the position to define services as follows:

A *Service* is a complex temporal entity (a complex occurrence) consisting of a service commitment and the corresponding process. Technically, we say that a service is the *mereological sum*⁴ of a service commitment and the corresponding process. (Ferrario & Guarino 2012)

Of course, this definition doesn't add much to our analysis, since most of the informative notions are embedded in the definition of service commitment. It allows however to address the terminological problems concerning for instance the distinction between *service presence* and *service availability*: we can say that a service is present when there is a commitment, and it is available when there is a process running.

Service Value Co-creation

Service Value Co-creation is a crucial part of the service system life-cycle. It is a complex process involving two symmetric value experiences: the customer's experience accounts for the service's benefits and the corresponding costs on the customer's side, while the provider's experience accounts of provider's benefits and the corresponding costs in implementing the service process. Such value experiences are also occurrences, and, altogether, service value co-creation is also ontologically dependent on the commitment. Note that service value co-creation is not part of the service itself, since it involves activities occurring at the customer's side: it is rather part of the *service system life-cycle* (see below). In our opinion, it is necessary to distinguish service value co-creation from both service commitment and service process. It should not be considered as equivalent to service process, first because value is in part produced by the interaction between service and the surrounding environment, and also because the service execution is not by itself sufficient to determine its value.

Service System

A *Service System* is defined as the mereological sum of all the objects anyhow involved in a service (through a participation relationship). In other words, while a service is a complex *occurrence*, a service system is a complex *object*, consisting of all the objects somehow participating to any of the sub-events, processes or states constituting the service. The sum of all these occurrences is the *service system life-cycle*, which is a temporal entity corresponding to the dynamics of a service system. So the difference between a service system and its life-cycle is like the one existing between a person and his/her life. Typically, a service system includes the provider, the customers, the resources used to produce the service, and so on.

⁴ I refer here to the notion of mereological sum as defined in (Varzi 2011): “[. . .] whenever there are some things there exists a whole that consists exactly of those things – i.e., that there is always a mereological sum (or “fusion”) of two or more parts.”

Concluding Remarks

Service science is just at its beginning, and a lot of work still needs to be done in order to properly understand service systems, which can be seen nowadays as complex socio-technical systems, where the interactions among humans, technical artifacts, organizations, and norms play a crucial role. These systems need to be studied and understood at the proper level of granularity, being aware of their basic physical, social, and micro-economic mechanisms, but at the same time distinguishing, analysing and describing the mesoscopic units that are part of our institutional reality. We strongly believe that using the formal tools of ontological analysis – i.e., systematically asking questions concerning identity, dependence, constitution, and similar basic notions – can help a lot to come up with well-founded, understandable, transparent models. In the current global crisis situation, achieving such kind of transparency is a key for participated governance and overall resiliency (Guarino et al. 2012)

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